



# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference lu6063		<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/EP 03/12190	International filing date (day/month/year) 03.11.2003	Priority date (day/month/year) 04.11.2002	
International Patent Classification (IPC) or both national classification and IPC C08F4/608			
Applicant BASELL POLYOLEFINE GMBH			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 9 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>			
Date of submission of the demand  02.04.2004		Date of completion of this report  17.02.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer  Fischer, B  Telephone No. +31 70 340-3769 	

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP 03/12190

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

### Description, Pages

1-31 as originally filed

### Claims, Numbers

1-9 received on 23.11.2004 with letter of 18.11.2004

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

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**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims	1-9
	No: Claims	
Inventive step (IS)	Yes: Claims	1-9
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-9
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

Reference is made to the following document

D2: WO 01/47635 A (FRITZE CORNELIA ; KRATZER ROLAND (DE); SCHOTTEK JOERG (DE); BASELL POL) 5 July 2001 (2001-07-05)

The document D2 is regarded as being the closest prior art to the subject-matter of claim 1, and shows in its examples 4 and 7 isolated catalyst solids containing A), B) C) and D). These solids are used to polymerise olefin in the presence of aluminum alkyl (see example 10).

The subject-matter of claim 1 differs from this known D2 in that the catalyst solid has to be precontacted with an organoaluminum before being brought into contact with the olefin.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The effect of this difference is an enhanced activity of the catalyst system (see example 1c and comparative example).

The problem to be solved by the present invention may be regarded as how to increase the activity of the catalyst system of D2.

There is no hint in the cited documents that would lead the skilled person in the art to modify the process of D2 in order to arrive to the present solution (claim 1).

The solution to the problem proposed in claim 1 of the present application is therefore considered as involving an inventive step (Article 33(3) PCT).

Claims 2 and 3 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Claims 4 and 5 related to a catalyst system are also novel and inventive because in D2, the solid catalyst does not contain any organoaluminum compound E) and the solid catalyst of the present invention shows an increased activity.

Claims 6 to 9 related to the use of such catalyst solids are novel and inventive for the same reasons.

23. 11. 2004

We claim:

(100)

1. A process for preparing a catalyst composition for olefin polymerization, which comprises preparing a catalyst solid in a first step by bringing

- A) at least one support,
- B) at least one organic compound of formula (II)



where

A is an atom of main group 13 of the Periodic Table or a partially halogenated or perhalogenated C<sub>1</sub>-C<sub>20</sub>-alkyl- or C<sub>6</sub>-C<sub>40</sub>-aryl group,

R<sup>4</sup> are identical or different and are each, independently of one another, hydrogen, halogen, C<sub>1</sub>-C<sub>20</sub>-alkyl, C<sub>1</sub>-C<sub>20</sub>-haloalkyl, C<sub>1</sub>-C<sub>10</sub>-alkoxy, C<sub>6</sub>-C<sub>20</sub>-aryl, C<sub>6</sub>-C<sub>20</sub>-haloaryl, C<sub>6</sub>-C<sub>20</sub>-aryloxy, C<sub>7</sub>-C<sub>40</sub>-arylalkyl, C<sub>7</sub>-C<sub>40</sub>-haloarylalkyl, C<sub>7</sub>-C<sub>40</sub>-alkylaryl or C<sub>7</sub>-C<sub>40</sub>-haloalkylaryl or an OSiR<sub>3</sub><sup>5</sup> group, where

R<sup>5</sup> are identical or different and are each hydrogen, halogen, C<sub>1</sub>-C<sub>20</sub>-alkyl, C<sub>1</sub>-C<sub>20</sub>-haloalkyl, C<sub>1</sub>-C<sub>10</sub>-alkoxy, C<sub>6</sub>-C<sub>20</sub>-aryl, C<sub>6</sub>-C<sub>20</sub>-haloaryl, C<sub>6</sub>-C<sub>20</sub>-aryloxy, C<sub>7</sub>-C<sub>40</sub>-arylalkyl, C<sub>7</sub>-C<sub>40</sub>-haloarylalkyl, C<sub>7</sub>-C<sub>40</sub>-alkylaryl or C<sub>7</sub>-C<sub>40</sub>-haloalkylaryl,

y is at least 1 and

x is an integer from 0 to 41,

- C) at least one organometallic compound and
- D) at least one organic transition metal compound

into contact with one another, then bringing this catalyst solid into contact with

E) at least one organoaluminum compound of the formula (I)



where

$\text{R}^1$  is  $\text{C}_1\text{-C}_{10}$ -alkyl,  $\text{C}_6\text{-C}_{15}$ -aryl, halo- $\text{C}_1\text{-C}_{10}$ -alkyl, halo- $\text{C}_6\text{-C}_{15}$ -aryl,  $\text{C}_7\text{-C}_{40}$ -arylalkyl,  $\text{C}_7\text{-C}_{40}$ -alkylaryl,  $\text{C}_1\text{-C}_{10}$ -alkoxy or halo- $\text{C}_7\text{-C}_{40}$ -alkylaryl, halo- $\text{C}_7\text{-C}_{40}$ -arylalkyl or halo- $\text{C}_1\text{-C}_{10}$ -alkoxy and

$\text{R}^2$  and  $\text{R}^3$  are identical or different and are each, independently of one another, hydrogen, halogen,  $\text{C}_1\text{-C}_{10}$ -alkyl,  $\text{C}_6\text{-C}_{15}$ -aryl, halo- $\text{C}_1\text{-C}_{10}$ -alkyl, halo- $\text{C}_6\text{-C}_{15}$ -aryl,  $\text{C}_7\text{-C}_{40}$ -arylalkyl,  $\text{C}_7\text{-C}_{40}$ -alkylaryl,  $\text{C}_1\text{-C}_{10}$ -alkoxy or halo- $\text{C}_7\text{-C}_{40}$ -alkylaryl, halo- $\text{C}_7\text{-C}_{40}$ -arylalkyl or halo- $\text{C}_1\text{-C}_{10}$ -alkoxy,

In a second step and then using this mixture for the polymerization without further work-up,

wherein the catalyst solid obtained by bringing the components A), B), C) and D) into contact with one another and the organoaluminum compound E) are brought into contact with one another at from  $-10^\circ\text{C}$  to  $80^\circ\text{C}$  for a period of from 0.5 minutes to 10 hours before the reaction product is used for the polymerization.

2. A process for preparing a catalyst composition for olefin polymerization as claimed in claim 1, wherein

F) at least one Lewis base

is used in addition to the components A), B), C) and D) for preparing the catalyst solid which is brought into contact with the organoaluminum compound E).

3. A process for preparing a catalyst composition for olefin polymerization as claimed in claim 1 or 2, wherein, in the formula (I) of the organoaluminum compound E),  $\text{R}^1$  is  $\text{C}_3\text{-C}_{10}$ -alkyl and  $\text{R}^2$  and  $\text{R}^3$  are each hydrogen or  $\text{C}_3\text{-C}_{10}$ -alkyl.

4. A catalyst system for the polymerization of olefins, comprising a catalyst composition prepared as claimed in any of claims 1 to 3.

5. A catalyst system for the polymerization of olefins as claimed in claim 4 which further comprises
  - G) at least one further organometallic compoundas scavenger with which the monomers are brought into contact before they come into contact with the catalyst composition prepared as claimed in any of claims 1 to 3.
6. The use of a catalyst composition prepared as claimed in any of claims 1 to 3 for the polymerization of olefins.
7. The use of a catalyst system as claimed in claim 4 or 5 for the polymerization of olefins.
8. A process for the polymerization of olefins in which a catalyst composition prepared as claimed in any of claims 1 to 3 is used.
9. A process for the polymerization of olefins in which a catalyst system as claimed in claim 4 or 5 is used.